

What is claimed is:

1. An ion trap mass spectrometer, comprising:

an ion supply source for supplying ions,

an ion storing section disposed between the ion supply source
5 and an ion trap and providing an RF electric field with an axial
electric ~~field~~ ^{potential J.T} inclined from an entrance side to an exit side of
the ion storing section for confining the ions near the exit side
of the ion storing section,

an entrance gate electrode disposed between the ion supply
10 source and the ion storing section, said entrance gate electrode
being controlled to introduce and retain the ions in the ion
storing section,

an exit gate electrode disposed between the ion storing
section and the ion trap, said exit gate electrode being controlled
15 to retain the ions in the storing section and emitting a bunch of
ions to the ion trap, and

an ion trap section comprising means for cutting off an RF
voltage while the bunch of ions emitted from the ion storing
section enters inside the ion trap, and means for suddenly applying
20 the RF voltage when a maximum amount of the ions stay inside the
ion trap.

2. An ion trap mass spectrometer according to claim 1, wherein said
ion storing section is formed of multipole electrodes as the means
25 for providing the radio-frequency electric field, at least one part
of the multipole electrodes being formed of a resistor.

3. An ion trap mass spectrometer according to claim 1, wherein said

ion storing section is formed of multipole electrodes as the means for providing the radio-frequency electric field, each electrode having plural sections divided in a longitudinal direction such that DC voltages are independently applied to the divided plural sections.

4. An ion trap mass spectrometer according to claim 1, wherein said ion storing section is formed of an assembly electrode as the means for providing the radio-frequency electric field, said assembly electrode including a plurality of annular electrodes arranged in an axial direction such that DC voltages and RF voltages are independently applied to the respective annular electrodes.

5. An ion trap mass spectrometer according to claim 1, further comprising an ion lens disposed between the exit gate electrode and the ion trap.

6. An ion trap mass spectrometer according to claim 1, further comprising control means connected to the entrance gate electrode, the exit gate electrode, the ion trap, and the ion storing section for controlling the same, said control section controlling the entrance gate electrode and the exit gate electrode so that the entrance gate electrode is opened and the exit gate electrode is closed to introduce the ions into the ion storing section; after a first predetermined period of time, the entrance gate electrode is closed while the exit gate electrode is closed to accumulate the ions at the exit side of the ion storing section; after a second predetermined period of time, the exit gate electrode is opened to

introduce the accumulated ions into the ion trap at once.

7. An ion trap mass spectrometer according to claim 6, wherein said control means determines the first predetermined period of time as a time for opening the entrance gate electrode based on a total ion amount measured in one of preceding same steps.

8. An ion trap mass spectrometer according to claim 6, wherein said control means controls said means for providing radio-frequency electric field to change at least one of parameters of the radio-frequency electric field and inclined electric ~~field~~ ^{potential} so that ions other than desired ions are excluded from the ion storing section before the ions are introduced into the ion trap.

9. An ion trap mass spectrometer according to claim 6, wherein said control means controls the means for providing the RF electric field to stop an application of the RF voltage to the ion storing section before introducing the ions therein so that the ions remaining in the ion storing section are removed.

10. An ion trap mass spectrometer according to claim 1, wherein a cooling gas is introduced into the ion storing section together with the ions.